A Preliminary Analysis of Online Discourse and Cognitive Complexity in A Graduate Early Intervention Course

Christine A. Marvin, Ph.D.

University of Nebraska-Lincoln

Norma J. Patterson, Ph.D.

Argosy University

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ABSTRACT

Comparisons were made between instructor and student contributions in an online course that engaged eight graduate students asynchronously in discussion of early intervention principles and practices. Discourse patterns and levels of cognitive complexity were analyzed as indices of engagement and “critical thinking”. The online students-initiated discussions as well as responded to instructor-prompted queries. Students used long speaking turns and questions at rates on par with the online instructor and had contributions that reflected a close match to the instructor at the higher levels of critical thinking. Implications are discussed for training early interventionists using distance education.

Key Words: online discussion, asynchronous learning network (ALN), critical thinking, cognitive complexity

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The growth of online courses related to early intervention and early childhood special education (EI/ECSE), at the preservice and inservice levels, have developed in response to a number of factors, including advances in technologies, shortages of qualified early interventionists for children with disabilities birth to age 5, increased financial incentives from the federal government, and a need for efficient, economical and high quality access to higher education for employed adult learners (Caro, McLean, Browning & Hains, 2002; Johnson, 2004; Ludlow & Spooner, 2001; Mueller, 2009). Graduate-level programs in EI/ECSE appear to attract both traditional on-campus students as well as non-traditional, employed students who may be changing careers, discipline-specific practitioners looking for specialization, and/or provisionally-certified teachers in special education (Knapczyk, Frey & Wall-Martenick, 2005). Online courses have often aimed to address the needs of the non-traditional group, either independent of, or in a hybrid offering with, traditional on-campus students. The challenges for institutions of higher learning that offer these EI/ECSE online courses appear similar to those reported a decade earlier in the fields of nursing, business, and engineering. Instructors must aim to assure that a) the online version of training is at least equal, if not superior, to any on-campus offering of the same content and b) the utility of ever-evolving technologies is maximized to support professional standards and instructional objectives and prompt higher levels of critical thinking and desired outcomes for students (Bullock, Gable & Mohr, 2008; Johnson, 2004).

Distance education in the United States often simulates activities of the traditional on-campus classroom. Instructors aim to replicate lectures and cooperative learning activities and ultimately, preserve the benefits of live, real-time “synchronous” interactions of face-to-face on-campus classrooms. Advances in technology have eased the manner in which instructors and students can now “meet” and interact (Johnson, 2004) despite the distance between them. Current availability of web-based “online” courses provide multimedia access for students at

their chosen location (home, work) and time. Online, asynchronous learning networks (ALN), within web-based course organizers, permit students to distribute their learning to fit their schedules (Dede, 1996), without sacrificing the attraction and strength of traditional instructor-student interactions. The ALNs offer a web-based medium for teaching/learning new content, posting reflections, asking questions and giving feedback and answers over extended hours and days, and can support ongoing “discussions” without the need for real-time gatherings.

Initially, the advent of distance education and online ALNs, in particularly, sparked both praise and enthusiasm (Peters, 1993), but also some ambivalence from learners and instructors. It was often rationalized that face–to-face classroom instruction was a superior educational experience because of the level of interaction among students and the instructor (Noble, 2001; Pittman, 2003). A related view held that online instruction was less effective and less satisfying than traditional on-campus courses for students of a particular “learning style” (Argon, Johnson & Shahik, 2002) or age (Maushak & Ellis, 2003). However, numerous studies and reviews of the available literature related to on-campus and distance education, and online instruction particularly in a wide range of professional fields, have refuted most of these concerns and biases (Russell, 1999).

Clearly, there is great variability in distance education courses, and good and bad quality abound. While students often indicate a preference for on-campus courses, they also indicate liking distance education for its flexibility and accessibility (Sherry, 2003). ALNs used for distance education tend to show slightly better effect sizes than synchronous modes of instruction in terms of retention of students and academic achievement in several studies (Bernard et al., 2004). The process of constructing an online course so content and technology complement each other may be key to assuring satisfaction and positive outcomes (Russell, 1999). What is needed is an understanding of the advantages ALNs can provide both instructors and distance education students, and how to assure those advantages.

The tendency for online courses to often have older, experienced students who are more independent, reflective and abstract thinkers than students in on-campus courses (Argon, Johnson, & Shaik, 2002; Howland & Moore, 2002) may explain some of the reported online advantages. What is not clear, however, is whether some aspects of a priori "styles of learning" are the reason for these students choosing or reporting satisfaction with asynchronous instruction or if the students' learning styles are influenced by this mode of instruction. Although style differences in approaches to learning do not generally affect students' academic success in most studies comparing on-campus and distance-delivered courses (Hong, 2002), Grasha and Yangarber-Hicks (2000) suggest that highly participant- and collaborative-learning styles in students lend themselves to better academic performance and course satisfaction, regardless of medium of delivery. Frederiksen, Pickett, Pelz, Shea and Swan (2002) and Swan et al. (2000) found that students who had the highest levels of perceived learning and satisfaction in online courses, also reported the highest levels of participation and interaction with their instructor and classmates. Therefore, the question remains: *Can an online course necessarily prompt high levels of participation and engagement, regardless of learning style, and therefore positive learning outcomes and satisfaction?*

Discussions and Critical Thinking

The amount of "reading" of text and posted discussion that is called for in online courses could be viewed as advantageous for students. Some authorities on college teaching believe that students may learn more efficiently from reading. McKeachie (1999) for example, suggests that college instructors need not lecture when concepts are available at an appropriate level in printed form. However, he also advises that instructors must assist students in learning from print by providing questions to guide thoughtful, integrative study and understanding of course material versus mere regurgitation of facts.

The effectiveness of distance education, therefore, generally hinges on the quality of the instruction, not the technology, and communications between instructor and students has long

been viewed as a critical contributor to that quality (Chickering & Ehrmann, 1996; Holmberg, 1986). It is generally accepted that online students and instructors have more demands than their on-campus peers in terms of amount of time committed to communication and learning (Dutton, Dutton, & Perry, 2002; Patterson, 2002), and a greater number of instructor-student and student-student interactions (Hill, Raven, & Han, 2002). This additional "time as a resource" phenomenon in online courses (Meyer, 2003) is believed to result in higher levels of learning (Miller & Pilcher, 2001; Swan et al., 2000). Extensive data exists to support the fact that students learn more when actively engaged with their instructor, classmates, and course material (McKeachie, 1999). These constructivist forms of teaching, however, where students construct knowledge from active experiences and interactions, and not simply from the instructors' talking and writing are often time consuming; students need to invest time to activities beyond reading and writing, to reap educational benefits.

The available and required "time to reflect" on what was "said" by the instructor, student, or text, and to respond clearly in online ALN environments has been reported as an advantage by most students and an explanation for the higher-level of critical thinking evidenced in online versus on-campus class discussions (Landis, Swain, Friehe & Coufal; 2007; Meyer, 2004; Redding & Rotzien, 2001). McCormick and Whittington (2000), however, found that differences in course content, as well as the instructors' use of non-exam type academic challenges also influenced the frequency with which students had opportunity to use higher cognitive levels of critical thinking.

EI/ECSE Fieldwork and Critical Thinking

The Professional Standards for Personnel Preparation from the Division for Early Childhood of the Council for Exceptional Children (DEC 2008) are not specific to on-campus student training; distance education programs must aim to achieve the same standards for their graduates. Programs must assure students ample opportunity to a) *Design, implement, and evaluate home and community-based programs and services* (standard AEC2S2), b) *Embed*

learning opportunities in everyday routines, relationships, activities, and places (EC5S3) and c) *Structure social environments, using peer models and proximity, and responsive adults, to promote interactions among peers, parents, and caregivers* (EC5S4). Creating field experiences for students in natural environments as part of a course or in follow up to a completed course is highly recommended, despite the challenges in arranging such experiences for EI/ECSE students (Chandler & Maude, 2008; McCollum & Catlett, 1997; Stayton, Miller, & Dinnebeil, 2003). The success of such experience, however, is dependent upon the quality of the placement/setting and the instructor's ability to supervise the activities, prompt reflection and provide adequate timely feedback on student-reported actions and ideas (Miller et al., 2003). Home visiting practica and case method instruction can offer students this experience (McBride & Brotherson 1997; McWilliam, 1992). Family-oriented experiences and case method instruction have been shown to facilitate application of child development and family-centered principles to real-life situations by bridging the gap from classroom and textbook to workplace (McCollum & Catlett, 1997; Munby & Hutchinson, 1998). Working with families during preservice training and having the opportunity to engage in reflection on those experiences with instructors and classmates increases the likelihood of students implementing family-centered services once they enter the EI/ECSE workforce (McCollum, Rowan, & Thorp, 1994).

Employed, distance education students are particularly attracted to these field-based, active learning experiences; they more readily link their education to their job and the applied activities with longer utterances than do traditional students in face-to-face classrooms (Harsh & Sohail, 2002). Furthermore, practica or case method discussions have reportedly spurred higher levels of critical thinking among students when engaged online when compared to their discussions of similar experiences in traditional on-campus settings (Heckman & Annabi, 2005). Students and instructors engaged actively in dialogue and exploration of real and hypothesized events, regardless of mode of interaction (synchronous or asynchronous) are believed to be

capable of high levels of critical thinking, and subsequently enhanced knowledge and learning outcomes for students. The influence of EI/ECSE practica with infants and families specifically, on students' critical thinking and course outcomes has to-date not been explored in an online course.

Assessing Critical Thinking

Higher-order critical thinking is believed to be an index of learning and future application of new information (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). The challenges of prompting and supporting higher-level critical thinking are unique in web-based courses where traditional face-to-face dialogue is not used, and asynchronous discussions stretch over many days.

Although many systems have been promoted for evaluation of online discourse (Landis et al., 2007; Marra, 2006; Meyer, 2004), Bloom's taxonomy (Bloom et. al., 1956) is the most well known for assessing the critical thinking or "cognitive complexity" of any instruction. Bloom's levels of cognitive complexity are often explained in the form of sample questions that an instructor might use to challenge that level of knowledge/skill (McDaniel, 1979); but they have also been explained with descriptors that apply equally to problem tasks, requested action and the complexity of written statements or presentations (McCormick & Whittington, 2000). Recent reviews of Bloom's work and subsequent applications have suggested six levels to include Level I: Knowledge (recall or recognition of information), Level 2: Comprehension (paraphrase, compare, classify by category), Level 3: Application (use information), Level 4: Analysis (dissect, recognize bias, discern relevant from irrelevant), Level 5: Evaluation (judge) and Level 6: Creativity (hypothesize, design, invent) (Anderson et al., 2001).

It is hypothesized that graduate students enrolled in a preservice early intervention course focused on infant-family interventions would be capable of critical thinking at the Application as well as Analyses/Evaluation levels if the course were paired with a home-visiting

practicum. Such a training package is intended to prepare the students for transfer of knowledge to the entry-level workforce in early intervention by engaging them in critical thinking that goes beyond the recall of terms and concepts.

The present study explores similarities and advantages associated with an online offering of a graduate-level course that focuses on infants with disabilities and a home-visiting practicum and that enrolls non-traditional students. The study examines a) the possible influence of various demographic variables and time commitments that include a home-visiting practica on course outcomes b) the discourse patterns of instructor and students in terms of speaking turns, initiations, responses, questions, answers and comments and c) the levels of critical thinking evidenced in instructor and student contributions to class discussions.

Methods

Participants

A total of eight students and one instructor participated as subjects for this study. Ten graduate students, enrolled in a graduate course entitled *Infants with Disabilities* (3 cr) were invited to participate; eight students from a summer, 8-week online offering of the course agreed to participate. Students were not required to enroll in this online version of the course; a spring term offering on campus was available in the same year.

Seven of the eight female students were non-traditional students, over 31 years of age and had experience with young children with disabilities. Five of the students were EI/ECSE majors pursuing masters or doctoral degrees and were currently employed in programs with infants and toddlers with disabilities. The remaining students included two non-degree students who worked with young children with disabilities as an occupational therapist or speech-language pathologist in community early intervention or early childhood programs across the state; one student was a full-time doctoral candidate in psychology. The students lived an average of 111 miles from the campus; two lived within 5 miles of campus while others lived

from 35 to 323 miles away. Only two students had experience with the university's web-based courses and the *Blackboard Learning System*; five had participated previously in interactive distance education courses using video-conferencing systems.

Instructor. The instructor was a full-time faculty member in the university's Department of Special Education and the academic advisor for all EI/ECSE majors (degree and non-degree). She had a Ph.D. special education with a focus in early childhood and 15 years experience as an early interventionist working with infants and toddlers in family homes; she also had experience supervising dozens of students in similar practicum contexts. Finally, the instructor had taught this course previously ten times and had five years experience teaching EI/ECSE courses online. The technologies used in this study were not new for the instructor.

Course Description

The graduate course was designed to address both the recommended practices of the Council for Exceptional Children's Division for Early Childhood (Sandall, Hemmeter, Smith, & McLean, 2005) as well as national and state-suggested professional standards for early childhood special education/early intervention (DEC 2008; Nebraska Department of Education, 2006). Specific course learning objectives included: a) understanding of typical and atypical development and inter-relatedness of developmental domains in children birth to age 3 with disabilities, b) demonstration of home visiting principles with children and family members, c) demonstration of assessment-based program planning, and d) demonstration of ability to deliver developmentally-appropriate practices in natural environments.

Course requirements. Students were required to complete course assignments with a family and child under age 3 in an approved practicum in their local community. These field experiences were arranged for unemployed students or students not currently working with infants and toddlers with disabilities. The instructor contacted regional, parent-support organizations and directors/supervisors of early intervention programs to solicit nominations for appropriate and interested families to partner with students. Families who were currently

receiving services associated with an Individualized Family Service Plans (IFSP) and who likely had an interest in partnering with the university, were contacted first by the program director or provider and invited to participate as “co-instructors” and onsite supervisors for these university students. If agreeable, interested families were contacted by the instructor for a phone interview and screened for appropriate expectations, understanding of responsibilities, available schedules, and travel distance for the students. Selected families were mailed a description of the course and practicum expectations. They returned a signed university agreement acknowledging their role and understanding that students would be coming to their home weekly to interact with them and their child, without the accompaniment of an on-site university supervisor. Families were provided an (unannounced) honorarium at the end of the semester for their cooperative efforts.

Employed students could focus on a child and family from their current early intervention caseload, given their supervisor’s approval and family agreement. These families also received a letter from the instructor explaining the field experience requirements for the student and the fact that visits associated with practicum assignments would not replace visits or distract from agendas already scheduled as part of their IFSP services.

Students completed six to ten visits in the family’s home, while enrolled in the 8-week course; visits lasted generally 60-75 minutes in length. Most employed early interventionists arranged for two to three additional visits to their already scheduled weekly appointments with families.

Students were also required to complete four applied assignments and a comprehensive final examination and participate online in class discussions at least once per topic. The applied assignments included 1) an *Assessment Report* of their child’s and family’s strengths and needs, 2) two or more *Home Visit Self-Reflections*, 3) two or more *Home Visit Plans*, and 4) a *Final Progress Report* reflecting the growth noted in the child, family, and student over the course of 8 weeks. Students in both courses took the *Final Exam* online and all assignments

were submitted electronically. Participation was rewarded with 1 to 2 pts per week based on the quality of the contributions to the discussion and topic; a rubric was used and shared with students to guide and judge “quality” postings. The total points earned contributed to 5% of the student’s final course grade.

Students were provided with weekly classnotes, video clips and handouts through the web-based course organizer, *Blackboard Learning System* (version 5.0). At a minimum, students were required to have Windows 95 (or later) or OS 8.6 (or later) systems, an Internet service provider and an email account. All students were directed to access free-download software for viewing video clips (*QuickTime*) and portable-document-formats (.pdf; *Acrobat Reader*); students without current email accounts were provided accounts free through the university. The *Blackboard Learning System* provided a format for text-based lecture/classnotes, a system of threaded asynchronous discussions, document sharing, email exchanges, access to multimedia learning materials, online examinations, and an online gradebook. All students could order textbooks and reading packets via the phone and have them mailed to their home from the University Bookstore. An 800 toll-free number was available to all students for contacting the instructor in lieu of online communications.

All interactions with the instructor and classmates were conducted online asynchronously. Students were expected to read classnotes weekly, independently review video clips and handouts associated with the classnotes, engage in posted discussions and activities, discuss weekly readings, and share home visit experiences, all through the asynchronous *Blackboard Learning System*. The instructor made personal contacts (email or phone) with each student at least twice during the term. The group met twice via a phone conferencing system in the second week and final week of the 8-week summer course to provide real-time opportunity for a course orientation and case study presentations. The instructor, or a university-selected mentor from their geographic region, visited each student onsite once for an agreed-to home visit. The mentors were generally alumni of the university

ECSE graduate program or a highly recommended early intervention practitioner in their state/region. The mentor observed a home visit and engaged student and parent in a collaborative reflection of the direction and quality of the interactions between student-parent, student-child, and parent-child.

Data Collection and Analyses

Three independent and four dependent variables were assessed. During the first week of class the on-line students were mailed hard copies of the *Demographic* and *Learning Style Forms* and provided a self-addressed stamped envelope for returning them when completed. At appropriate points in the term, students completed the *Time Commitment Log* for a randomly selected two-week period (between weeks 2 and 6). Students completed a *Course Evaluation* (week 8) to report their perceptions of ease in accessing the instructor and overall course satisfaction. After the course was completed, trained research assistants reviewed the assigned *Grades* on completed assignments and exams, and the online discussions were coded for *Discourse* and *Cognitive Complexity* patterns. Simple statistics were used to describe all these variables for this small sample.

Demographics. Students were asked to provide information regarding age, major, employment and years experience working with young children with disabilities. Students provided additional information about their distance from the home campus, and their experience with distance education courses and technologies.

Learning style profiles. Students were asked to indicate on paper where, along a four-point scale, they would place themselves for 14 items describing their typical learning behaviors (i.e., talking and acting vs. listening and reacting) and 14 items describing their learning traits (i.e., intuitive, and emotional vs. logical and intellectual) (adaptation of the *Learning Style Inventory* by Kolb, 1984). The items reflected varying degrees of feeling, thinking, doing, and watching. Students' ratings were used to categorize them into one of four cells reflecting these learning qualities; these included the: *Enthusiastic Learner* (feeling doer), *Practical Learner*

(thinking doer), *Imaginative Learner* (feeling watcher), and *Logical Learner* (thinking watcher). The data were analyzed for the diversity of learning styles evident in the class and the frequency of any one style among the students enrolled.

Time commitments. Students were asked to keep a time log for any two-week period in the course, after they had initiated home visits. Students were to record time spent (in minutes) in each of eight tasks associated with the course and listed on a form provided to them. These included reading assigned classnotes, articles, and textbook chapters, working on projects/assignments, making home visits, planning/reflecting on home visits, online discussions with instructor and classmates, and private discussions with instructor or with classmates. Since the students were completing the summer course at twice the typical rate (8 weeks vs. 16 weeks), the data from their time sheets for the 2-week period were adjusted by dividing reported minutes for each item by two to reflect time commitments in a traditional 16-week course. Results are reported in hours per week.

Student satisfaction/perceptions. All students were asked at the end of the term to complete an online survey and rate various components of the course including the instructor, readings, assignments, and activities. The 5-point rating scale reflected a continuum of excellence (excellent/unacceptable) or satisfaction (very satisfied/very unsatisfied). Items were summarized with a mean rating per item. In addition, all participants were contacted and invited to provide personal perceptions of the course through a phone interview. Six participants agreed to recorded interviews. The second author conducted all interviews and used open-ended questions to pursue understanding of students' expectations for the course, most satisfying activities, self-assessment of learning and their perceptions on how the materials, instructor and interactions with classmates influenced their learning. Quotes from these interviews are used to explain quantitative data collected in the study.

Grades. The individual assignments and final course grades were assigned on a traditional 100% scale with grades over 90% assigned a letter grade of A. A grading rubric was

used to guide instructor feedback and assignment of points on assignments and aided consistent grading across students. Students were provided a copy of each grading rubric.

Instructor-Student Discussions

The quality of instructor-student discussions in this online course was analyzed for two topics from the 3rd (parent-child interactions and communication interventions) and 6th week of this summer course (cognitive intervention and child-focused activity planning). The two weeks of data were collapsed into a single set and used for coding the quality and complexity of instructor-student discussions to avoid bias of one topic influencing student and instructor interest and/or behaviors. The frequency and percentage of all contributions were calculated for both the instructor's and student-initiated interactions, responses, questions, answers and explanations/comments. Furthermore, all instructor and student "speaking turns" in these class discussions were counted and coded for the level of critical thinking (cognitive complexity) reflected in each contribution. The asynchronous web postings related to the selected week's topics were printed to capture the online students' interactions with the instructor. These class discussions included reference to the on-line class notes and video clips, assigned readings and students' home visit experiences.

The unit of analysis was a student or instructor contribution on a topic, defined as a subject maintained over one or more utterances. Student and instructor contributions varied in length from one word (e.g., "Yes") or one sentence, to multiple sentences/statements before a new topic was introduced or a new speaker took a turn. A speaker could have one or more units/topics per speaking turn.

The *Blackboard* threaded discussions provided a permanent record of the student-instructor discussions. The discussion board format identified each speaker by name, and noted the date and time of each student/instructor online-posting. Generally, these individual postings were considered a speaker's contribution or "turn" and contained the unit(s) for analysis. However, if a clear shift in topic was evident within a posting, using a paragraph break

or explicit vocabulary shift, then a single posting (turn) would be divided into two or more units for purposes of coding.

A trained research assistant first reviewed the online postings for administrative and instructional content. Only content coded as relevant to instructional objectives were used for this study; references to administrative aspects of the course (i.e., procedures for submitting assignments) were excluded. Each unit of analyses related to instructional objectives received five codes noting the 1) identification of the speaker (instructor or student), as well as the 2) *function* (initiation or response), 3) *format* (question, answer, or comment), 4) the number of *units* (topics) per speaking turn and 5) the *cognitive complexity* of each unit. Appendix A provides definitions for these codes. The average number of turns per speaker was also calculated since some students contributed more often than other students, and speakers could address one topic or shift topics multiple times before ending their post (online) and abdicating the speaking role to another speaker.

The cognitive complexity of each recorded unit was analyzed using a four-level adaptation of Bloom's Taxonomy of critical thinking (Anderson et al., 2001; Bloom et al 1956); two of Bloom's suggested levels of complexity were combined to assure respectable inter-rater reliability. These included Level I: Knowledge/Comprehension, Level II: Application, Level III: Analyses/Evaluation, and Level IV: Creativity/Syntheses. Each unit of analysis was coded for the highest level of critical thinking evident in the speaker's contribution. Appendix A contains definitions used for each of these four levels of critical thinking.

Two trained research assistants established reliability of coding by independently coding 50% of the instructional units. The research assistants were trained together in the meaning of each code and provided opportunity to practice coding until a minimum of 70% agreement was established per code. Comparisons were made for agreement/ disagreement of codes assigned per unit. Mean agreement for the discourse codes was 92.6% with a mean agreement of 80% for number of units evident per speaking turn. The mean agreement for coding the level of

critical thinking across all units was 67.5%; mean scores for the four individual levels ranged from 60% (level I) to 72% (level IV) with individual samples having agreements as high as 82%. The most common disagreements were for units coded as Level II or Level III. A third person familiar with the code definitions discussed identified differences in assigned codes with the two research assistants, and a consensus was established for the most appropriate code to assign. Appendix A provides a listing of the inter-rater agreements for each code. Correlations (Spearman's rho coefficient) were computed to explore the relationship between the student and instructor levels of cognitive complexity in class discussions with select student demographic variables, learning styles, time commitments, and grades for assignments, exams, and course.

Results

Learning Styles

Imaginative learners (Kolb's feeling/watching) were common (n = 5) in the online course. Other learning styles included Enthusiastic Learners (feeling/doing; 1) and Practical Learners (thinking/doing; 2); there were no Logical Learners (thinking/watching) in this class.

Time Logs

Students committed a significant amount of time in this 8-week, online summer course. Students reported spending on average 22.4 hours on course- and practicum-related activities over the 2 weeks during which they logged their time (11.2 hrs/week). The online students invested their time reading the classnotes an average 1.35 hrs/week and reading articles and textbook chapters 2 hours/week. An additional 3 hours/week, on average, were reportedly used completing course projects/assignments, and an average of 2+ hours/week engaging in online discussions and 2+ hours/week home visiting and planning and reflecting on these practicum visits. Despite the aim for once weekly home visits, many of the students in this summer session made two to four home visits in a 2-week period; some of the online students were employed as early interventionists and had reason to visit the family more often.

<Insert Table 1 here>

Student Satisfaction

Students reported satisfaction with the course and the instructor. The students rated the effective use of class time, presentation of course materials, advancement of own skills and knowledge and instructor's interest, fairness, and knowledge at 4.25 or higher on the 5-point scale. The online students rated the course overall a 4.1 but rated higher (4.25) the value of discussions and their ability to self-evaluate their own effectiveness in home visits. Interviews confirmed the students' satisfaction; all six students indicated that the course objectives and/or their expectations had been met. Comments included:

"I was kind of skeptical at the beginning how this would all work… I feel really confident now when I do home visits. "

" ... It tied a lot of things together for me…."

The practicum and online discussions with classmates were mentioned repeatedly as the most satisfying learning activities in the course.

The discussion board ….was probably the favorite thing for me… I could probably have spent all day on there."

"I think I am more of a reflective type person. A little bit slower to react to things and it [online discussion] gave me time to do that."

"Definitely the practicum of going into the home and working with the kids because you get to see the progress… and I did get to see progress with this child…"

"The discussion on the Blackboard was really helpful too because you had people like behind you [that] you could talk to about different ideas, or if they were going through the same thing, that kind of helps as well."

Grades

The students had a mean final course grade of 3.4 (B+) on a 4.0 grade scale. Students averaged 82% on the final exam (range: 72% to 92%) and a mean 96.3% on home visiting assignments (range 80% to 100%).

Student-Instructor Discussion Patterns

Overall, students and the instructor used their time "in class" in similar ways during the two weeks of class discussions. A total of 232 speaking turns were divided between the eight students (136) and the instructor (96), with the 359 individual units/topics (< 3% administrative topics) distributed equally; 189 units were coded for the students, while 170 were coded for the instructor. Table 2 summarizes the discourse qualities related to student and instructor speaking units.

<Insert Table 2 here>

Speaking turns. There was significant variance in how much any one student contributed to the class discussions. The number of speaking turns ranged from 8 to 60 per student, with an average of 17 turns per student. No one student, however, dominated the discussions; rather it was more common that one or two students contributed less frequently each week. Furthermore, the online students were efficient with each speaking turn, using a mean of 1.8 units (topics) per speaking turn. Students shifted topics up to six times in a single posting (turn), thereby maximizing their time and access to the instructor and classmates; 46% of their posted "talk' consisted of multiple topics (units). Although the instructor's contributions to class discussions were slightly less numerous, the instructor was more efficient than students; her 96 speaking turns resulted in a mean of 2.6 units/turn in the asynchronous online discussions.

Speaker's function and form. Table 2 summarizes the students' and instructor's contributions to the class discussions. Not surprising, over three-fourths of the student contributions to class discussions were in the form of responses, with answers surpassing the use of questions and comments two-fold. The instructor, however, also played the role of responder more often than initiator of class discussion, suggesting some parity between

instructor and student for the topic initiations. The difference between the student and instructor contributions is seen in their use of questions, answers, and comments. Whereas the students used answers for nearly one-half of their responses, the instructor answered student-initiated queries in only 12% of her speaking units; the instructor was more likely to comment (i.e., explain, elaborate; 56%) or pose a question to the group or individual student. Questions, either to initiate a topic or possibly within a response, were used least often by both speakers; less than 25% of the student units and 32% of the instructor contributions were coded as questions. Figure 1 provides a graphic representation of the student-instructor discourse patterns.

<Insert Figure 1 here>

Cognitive Complexity of Online Discussions

Students. Over 72% of the students' coded contributions to class discussions reflected the two highest levels of critical thinking (Levels III & IV); table 3 shows the percentage of student-generated units coded at these levels of Analyses/Evaluation and Creativity/Synthesis. There were no statistical differences among the students for the use of critical thinking at various levels and no differences between EI/ECSE majors and non-majors enrolled in the course.

<Insert Table 3 here>

Instructor. The largest percentage of instructor topics (over 60%) were coded at the Analysis/Evaluation level (Level III), followed by the Application level (19%); the smallest percentage of instructor contributions to class discussions reflected critical thinking at the level of Creativity/Synthesis (Level IV).

Figure 2 graphically represents the percent of student and instructor contributions at each of the four levels of cognitive complexity. The match between instructor and student contributions was similar across cognitive levels in this online course; no significant differences were noted. Students however, used twice the number of speaking turns than the instructor at the highest level of Creativity/Synthesis.

<Insert Figure 2 here>

Student demographics and course outcomes. Overall, there were mostly low-to-moderate, non-significant correlations between the students' level of critical thinking in class discussions and their demographic qualities and course grades. No significant relationship was noted between the students' learning styles and their level of critical thinking in class discussions. The cognitive complexity of students' online contributions were positively correlated with grades assigned to the students for their *Home Visit Self Reflections* (r = + .91, p = .011), as well as for their final grades (r = + .71), although this latter relationship was not statistically significant. Low, non-significant correlations were noted for the time students reportedly spent online in discussions with the instructor or classmates and their level of critical thinking in posted discussions. A moderate positive correlation (+ .40) was noted for reported online time commitments and the grade received on the final exam.

Low, but significant correlations, however, were identified for both the students' and instructor's level of critical thinking in class discussions and their discourse qualities. The number of speaking turns students used in class discussions were significantly, albeit minimally, related to their level of critical thinking (r = + .16, p = .03); the more turns, the higher the level. Conversely, the online instructor's number of speaking turns was negatively but significantly correlated to her level of critical thinking in class discussions with the students (r = -.31, p = .000); the fewer turns taken, the higher the instructor's critical thinking levels. Finally, the percent of answers online students gave during class discussions was also negatively and significantly correlated to their levels of critical thinking (r = -.15, p = .035); the fewer answers given the higher the students' level of critical thinking per contribution.

<Insert Table 4 here>

Discussion

An investment of time equates to valued time for these findings, if the "time as a resource" phenomenon is true (Meyer, 2003). The students saved time driving to/from campus

and sitting in a traditional 3-hour class weekly but invested 7+ hours weekly accessing and discussing online course content in addition to reading articles/chapters and completing course assignments, plus 4 hours weekly preparing and completing home visits. The added time investment, and not the students' learning styles, may explain the students' satisfaction and outcomes in this course. Learning styles were primarily *Imaginative* or "watchers" with only three students reporting "doer" styles of learning. The lack of any significant correlations between levels of cognitive complexity and learning styles or time commitments, however, would suggest that neither was related to the critical thinking levels demonstrated. And yet, the student interview data indicate that student satisfaction with two activities accounted for 40% of the students' time commitments, namely home visits and online discussions. The students who reported a preference to watch and listen (Imaginative Learners) were engaged as doers when the online course requirements were organized to allow repeated, meaningful activities and interactions.

The practicum requirement appears to have confirmed the suggestion by Heckman and Annabi (2005), that case study discussions can prompt critical thinking at levels higher than simple knowledge and comprehension of facts and concepts. The students engaged in discussions at the Application level or higher for more than 90% of their speaking turns and less than one-third of their contributions were at the Application level or lower. The instructor as well, contributed to these three higher levels of critical thinking with over 80% of her initiations or responses. The predominance of critical thinking at the level of Analysis/Evaluation, by students and instructor, suggests that references to practicum experiences did not limit class discussions to only case reports of strategy applications. More likely, the students' various experiences provided fodder for consideration of key concepts and strategies introduced in the course by allowing for reflection on relevant and irrelevant applications across the various students' home visit situations, children, and families. Although the use of a single case example for all students to discuss can provide a useful focus for demonstrating application of

select strategies and concepts (McWilliam, 1992), the diversity of multiple case examples in this course likely provided the students and instructor added opportunity to justify one application over another and repeatedly apply and evaluate the practices reported by students in uniquely different situations. Furthermore, the evidence of critical thinking at the level of Creativity (level IV), albeit limited, would suggest that some students and the instructor had some opportunity to engage in or witness exchanges that led to designing, inventing and/or hypothesizing possible applications, which would move some students beyond their own practicum situation.

The online course, therefore, with its practicum requirement, appears to have prompted or supported discussion among students at the higher levels of critical thinking. The instructor initiated and responded to students in a manner that would encourage critical thinking at levels of Analysis/Evaluation and Creativity/Synthesis, and that reflected or surpassed the objectives of the course, which aimed to have students apply new skills in real-world situations. The online instructor spent more than half her speaking turns responding to student-initiated discussions and at levels beyond simple application of information.

The correlations between student turns and critical thinking for these online students suggested that the higher levels of critical thinking also may have been related to the students' active engagement in online discussions, evidenced by their elaborated speaking turns. The students in the current study had speaking turns that were significantly longer than those typically provided by on-campus students (Harsh and Sohail; 2002). These extended contributions from students online may have played a significant role in helping classmates understand the application and evaluation of course content. In addition, online delivery of this early intervention course offered students an equitable relationship with the instructor; energies appeared directed toward content understanding and analyses instead of role identities. It did not appear to matter who raised the question or who answered it. The relationship between number and length of turns and cognitive complexity cannot be considered causal however,

since the higher order thinking may have necessitated students' longer and more complex contributions, thus engaging the students more.

It is not clear from the current data whether the online students prompted the instructor or vice versa in terms of challenging the cognitive complexity of contributions. Future research is needed to explore the role the instructor plays specifically in fostering productive online discussions at various levels of cognitive complexity. A review of the online students' and instructor's questions, comments, initiations, and responses, sorted by lower and higher levels of critical thinking, as well as the number of speaking turns collectively needed to achieve higher levels of critical thinking per topic might reveal the efforts needed to maximize learning in this ALN format. This mode of course delivery may be responsible for maximizing the students' abilities and preferences for active learning approaches, since the students in the current study initiated discussions at rates comparable to the instructor. Although the incentives were small, the points awarded by the instructor for weekly contributions also could have played a role in motivating student contributions. Course evaluations and interviews however suggest student satisfaction and value for these discussions. Before conclusions can be made about the influence an ALN format itself has on student contributions, further analyses is needed to examine whether the student initiations as well as responses were at the higher levels of critical thinking and whether high level contributions would exist if no incentive points were awarded.

Finally, further study is needed to understand the specific role a practicum plays in enhancing course discussions and learning outcomes for EI/ECSE students and content; the current study did not offer a no-practicum condition that could be used as a comparison of student outcomes and discussions and did not analyze topics (i.e., practicum-related) by level of cognitive complexity. In addition, the older, non-traditional student may be more flexible in their learning preferences than younger on-campus students for whom so many learning style profiles are designed. Studies are needed to explore this hypothesis. The small sample size of

the present study limited the type and meaningfulness of statistical analyses related to these demographics, time commitments and specific outcomes.

The use of online instruction for graduate-level EI/ECSE preservice education is supported by recent research. Despite the small sample size of the current study, the accelerated offering of content in a short summer session, and the potential bias of the experienced learners, the possibility exists that ALNs provide early intervention students with valued learning experiences and may even excel in efficiently meeting the needs of non-traditional students who otherwise would not be able to secure needed education for entering the field and reducing the shortages of trained qualified personnel in EI/ECSE programs. The success of such efforts, however, would appear to be dependent upon how the instructor develops the course, facilitates, and responds to the students' interactions/discussions, and possibly whether a practicum is required or not.

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Appendix A

Discourse and Cognitive Complexity Code Definitions and Reliability Scores

Code	Definition	Coding Reliability
Focus	Administrative: topic related to course mechanics (assignments, due dates, grading, etc.)	100%
	Instructional: topic related to content/ objectives	
Speaker	Instructor	
	Student	99%
Topics per Turn	Number of topics per turn	80%
Function	Initiation: start of new topic	
	Response: reply in reference to topic initiated by another speaker	88%
Format	Comment: elaboration or explanation of concepts or terms	82%
	Question: inquiry (direct or indirect)	
	Answer: response to a question posed by another speaker	
Cognitive Complexity	Definition	
Level1: Knowledge and Comprehension	Retrieve, recall, remember, describe past information or experience	60%
	Define the meaning of concept or term	
	Compare/contrast given factors	
	Find or identify example from a set of facts	
	Here, now, recent	
Level 2: Application	Using specific knowledge put in new situation/ circumstance/context	68%
	Describe/demonstrate particular concept or step of a novel application/example	
	Compare/contrast/choose possible/not possible applications/scenarios to apply to a new context	
Level 3: *Analyze/Evaluate*	Explain/justify relationship/rationale	69%
	Discuss the parts of a whole/process/ scenario (relationships/identify parts)	
	Judge the merit of the parts or process	
	Make a judgment based on facts/set criteria or opinion, values	

	Problem solve Identify cause/effect Detect pros or cons, good or bad Decide	
Level 4: *Creation/Synthesis*	Construct/compose/design/outline a plan Put together to form a whole Collate, collect Anticipate/predict/hypothesis about origins or outcomes. Form new ideas/concepts/perceptions. Create, repackage, re-organize parts in to a new whole or pattern. Provide an alternative solution, plan (multi-step) or procedure	72%